

The effect of educational leadership on students' achievement: a meta-analysis study

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Abstract In this meta-analysis study, different leadership styles were combined, and the relationship between educational leadership and student achievement was analyzed. In the literature review, 57 research articles/dissertations, independent from one another, were brought together, and 28,964 study subjects were included in the sample group. The results of the analyses performed with a random effects model revealed that educational leadership has a medium effect on students' achievement. As was expected, the most comprehensive effect among leadership styles was found in distributive and transformational leadership. Considering the effect of educational leadership on students' achievement, it is recommended to examine the effect of leadership on other components of school and shareholders in future studies.

Keywords Leadership · Educational leadership · Achievement · Meta-analysis

Introduction

The great man leadership approach, which dominated leadership discussions by the end of the 1800s, encouraged the emergence of the *trait leadership approach* at the beginning of the 1900s. This period was characterized by the discussion of a “singularized power” and “authority.” The

source of this power and authority was the hierarchical power granted by the group to the leader because of the leader's innate traits. The concept that “there is no significant correlation between leadership and physical properties and high intelligence” expressed in the studies conducted by Stogdill (1948, 1950) puts an end to the notion that a leader bears innate leadership traits that are specified in the trait approach and therefore puts an end to the trait approach. In addition, Stogdill (1948) expressed that capacity, success, responsibility, participation, and situational assessment constitute the sub-categories of the personal factors associated with leadership and that it was not possible to be a leader with certain traits. In the 1940s, *group leadership* began to prevail in the leadership field. Whyte (1943) described group leadership as an influence free from relationships based on power and self-interest. In group studies in the 1950s, the group approach was shown to be effective and concordantly paved the way for behavioral theories that attempted to explain leadership by the tendencies of the leader. These studies prompted the first experimental studies on leadership to be conducted at Ohio State University (Halpin and Winer 1957) and the University of Michigan (Katz and Kahn 1952), which were the sources of the first modern studies. In line with this development, in the 1960s, the *behavioral leadership approach* became recognized. Fiedler (1967) explained that the behavioral approach was designed to help employees perform their jobs in a coordinated manner. The Ohio State and Michigan studies discussed leadership in terms of two behavioral dimensions: consideration and initiating structure.

After this period, *situational leadership approaches* were conceived; these use the situation as the reference point. These theories are as follows: *efficient leadership theory* (Fiedler 1967), which puts the tendency toward duty

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or relationships to the forefront; *3D leadership theory* (Reddin 1970), which adds the dimension of efficiency to the duty and relationship dimensions of situational leadership theory; *path-goal theory* (House 1971), which puts an emphasis on the leader's motivational roles; *situational leadership theory* (Hersey and Blanchard 1972), which associates the emergence of leaders to the situation rather than the person; and *normative leadership theory* (Vroom and Yetton 1973), which considers decision making the most important task performed by leaders.

After the 1990s, research based on new theories that were discovered included *shared leadership* (Gronn 2006), *distributed leadership* (Elmore 2000; Gronn 2000, 2002; Spillane 2005), *servant leadership* (Greenleaf 2002), *ethical leadership* (Brown and Trevino 2006), *spiritual leadership* (Fry 2003), and *authentic leadership* (Gardner et al. 2011). As stated above, the discussion of the theory and classification regarding the concept of leadership has continued until today, and it seems that it will persist for years to come.

Educational leadership: a conception framework

There are a variety of perspectives concerning leadership in terms of institutions and organizations, and it is a very popular research subject in the field of education (Krüger and Scheerens 2012). Leadership is associated with schools and administrators in education studies. School administrators are expected to guide all employees and students, support them, undertake all responsibility, and inspire them to meet the objectives of the school. Furthermore, school administrators pave the way for curriculum reform and the development of a positive learning environment (Cotton 2003; Hallinger 2005; Huber 2004; Nichols 2011).

Studies about school leaders accelerated with *effective school research* in the 1970s. Research conducted in England and North America found student achievement in certain schools to be greater than in other schools. The researchers argued that this situation could not be explained just by the unique individual and social characteristics of the students but that the real difference between the schools was to the leadership behaviors of the school administrators. Hence, educational leadership began to be discussed more frequently in education studies because of this finding (Bamburg and Andrews 1991; Krüger and Scheerens 2012; Ross and Gray 2006).

The school leader is the person who plans and maintains program development, allocates resources, improves the performance of employees and students by encouraging them, and guides them to meet the objectives of the school. Upon determining the objectives of the school, school leaders ensure that these objectives are stated and agreed upon with the students and teachers. Furthermore, these

leaders manage the out-of-school activities. They direct the employee and student activities in other areas of the school, encourage local organizations to work with the school, and collaborate with families and business organizations (Busher et al. 2000). In conclusion, school leaders undertake the main responsibility of ensuring that student achievement is at its maximum potential.

The studies conducted on student achievement assume that there is a direct relationship between educational leadership and student learning. Additionally, it is thought that educational leadership has an indirect effect on student's learning (Balci 2007; Bulris 2009). Despite the high number of studies that show that educational leadership does not have a direct effect on student's achievement, school leaders are generally held responsible for the achievement of students (Ross and Gray 2006). As reflected in the literature, the importance and size of this effect are multi-dimensional and open to discussion. Within this scope, school leaders focus on a common goal and learning objectives to create and maintain effective and successful schools (Leithwood and Riehl 2003).

Many researchers agree that school leaders have an important effect on all individuals who comprise the school community, particularly on teachers and students. However, the importance and extent of this influence is open to discussion has multi-dimensional characteristics. Furthermore, the effect of school leaders on students' learning and achievement levels, which are among the outputs—or results—of the school, is a complex issue. The outputs and student levels in question are affected by various in-school and out-of-school environmental factors. It is difficult to determine experimentally to what extent leadership affects in-school and out-of-school activities.

The fact that students do not interact only with teachers in their school suggests that many variables have an influence on the behaviors that students are supposed to display. The fact that the behaviors of school leaders, as one of the aforementioned variables, are the focus of a number of studies underlines the importance of this issue. Studies that aim to reveal the relationship between school leaders' various behaviors and student achievement associate the behaviors of school administrators with exams whose validity and reliability values were widely agreed upon. School leaders can achieve sustainable developments as a consequence of determining, measuring, and controlling factors regarding expectations and standards of school life, except for the tests on which students are expected to be successful (Schlechty 2005; Mullis et al. 2012).

Research hypothesis

Today, many studies that investigate the effects of educational leadership on various organizational outputs are

available. More specifically, the number of studies in this scope that investigate the effect of educational leadership on students and student achievement, which are the basic requirements of the school, is rapidly increasing. Many studies conducted within this scope have found a positive relationship between educational leadership and student achievement (Boyer 2012; Harris 2012a, b; Nelson 2012; Noe 2012; Raines 2012; Tindle 2012; Troutman 2012). Furthermore (1), leadership style is the manner and approach of providing direction, implementing plans, and motivating people. As observed by the employees, it includes the total pattern of explicit and implicit actions performed by their leader (Newstrom and Davis 1993), (2) the courses studied to determine academic achievement through the research, and (3) the level of education at the school where the research was conducted and that could affect the average influence obtained in this study was determined as the moderator. Various studies found effects of leadership styles that were derived from theories of educational organization (such as instructional leadership) and theories of service and production-oriented organizations (such as transformational leadership) on student achievement for the moderator of leadership styles (Schrum and Levin 2013; Shatzer et al. 2013; Shin et al. 2013). In this context, the most substantial moderator variables were leadership styles. Additionally, results of the studies were used to define the other moderators. For example, the findings of the researches examining the effect of leadership on the academic achievement in various lessons differ: Gulbin (2008) and Maeyer et al. (2007) found that the leadership does not have an effect on mathematics achievement, while Braun (2008) and Estapa (2009) found that it has an effect on language achievement. The similar differences occur for the level of education at the schools: On one hand, Gulbin (2008) and Odegaard (2008) found that the leadership does not have an effect on the student achievement in secondary level. On the other hand, Davis (2010) and May (2010) explored that it has a considerably high effect on student achievement in elementary level. As can be seen in these researches, the effect of leadership on student achievement varies with both the courses of studies and the level of education at the schools. With all these variables, in light of previous studies' results, the following hypotheses were tested in this study:

H1 Educational leadership has a positive effect on students' academic achievement.

H2 Leadership style is a moderating variable for the positive effect of educational leadership on students' academic achievement.

H3 The courses studied to determine academic achievement within the studies are the moderating variables for the

positive effect of educational leadership on students' academic achievement.

H4 The level of education at the school within the studies is a moderating variable for the positive effect of educational leadership on students' academic achievement.

Methods

Study design

In this study, the effect of educational leadership on students' achievement was tested with a meta-analysis design. Meta-analysis is a design used to gather the results of several independent research studies on certain subjects and to apply a statistical analysis on the findings acquired (Littel et al. 2008; Petitti 2000; Wampold et al. 2000).

Scanning strategy and inclusion

First, a literature review was performed in ProQuest and EBSCO academic databases to determine the studies to be included in the meta-analysis. At this phase, the leadership term was taken as a base, and the terms *achievement*, *academic achievement*, *student achievement* were used in the title, keywords, and abstract fields. The publication deadline to be included was September 2013. Additionally, doctoral theses and research that was published in peer-reviewed journals were included in the analysis. The reason for the inclusion of dissertations was to remove the possible publication bias.

Several strategies were used to determine the appropriate research to include in the meta-analysis. First, the research process was reduced to certain keywords, titles, and abstracts, and 172 research articles/dissertations were selected upon reviewing all research conducted on leadership and student achievement. Then, the research abstracts were reviewed. Among these, 51 research articles/dissertations were not related to educational leadership, 40 research articles/dissertations did not specify r/R^2 values, and 11 research articles/dissertations were qualitative studies. Thus, 102 research articles/dissertations were excluded from the analysis. In the second phase, the remaining 70 research articles/dissertations were analyzed in detail; 57 of these articles/dissertations were found to be appropriate, and the other 13 were deemed inappropriate. Descriptive statistics on those 57 studies are given in Table 1.

Inclusion criteria defined for this study are as follows:

- The studies were conducted between 2008 and 2013.
- The studies include statistical information required for correlational meta-analysis.
- The studies measure educational leadership.

Table 1 Features of the studies included in the meta-analysis

Characteristic	1	2	3	4	5	6	Total
Publication year of research	2013	2012	2011	2010	2009	2008	–
<i>n</i>	5	10	12	12	10	8	57
%	8.7	17.5	21.0	21.0	17.5	14.0	100
Type of research	Dissertations	Article					–
<i>n</i>	50	7					57
%	87.7	12.3					100
Leadership styles of research	Leadership practices	Transformational	Instructional	Distributed	Others		
<i>n</i>	24	15	8	2	8		57
%	42.1	26.3	14.0	3.5	14.0		100
Courses of research	Mixed	Math	Reading	Language			
<i>n</i>	34	12	8	3			57
%	59.6	21.0	14.0	5.2			100
The level of education at the school	Elementary	High	Middle	Mixed	Secondary		
<i>n</i>	24	13	9	7	3		56
%	42.1	22.8	15.7	12.2	5.2		100

Coding and operational definitions

Coding is a data extracting process during which clear data and data appropriate for research are extracted from the compiled information in the studies. A coding form was created before the analysis, and the coding was performed in accordance with this form. The main objective of this procedure was to develop a special coding system that was both general and unique enough not to miss the characteristics of any type of research. The coding form created for the study included the following components:

- References of the research
- Information on sampling
- Data collection tool(s)
- Information on methodology
- Quantitative values

The operational definition is to make the concepts of research testable and to explain the variables, standard observations, and measurement processes according to the purpose. In this context, the definitions of the variables in the study are as follows:

- *Moderator variable*: The variables that are thought to cause the effect size distribution to become heterogeneous are leadership style, the level of education at the school, and the courses studied to determine academic achievement within the studies.
- *Student achievement*: the amount of knowledge and skills students obtain from a particular curriculum. The

scores that students receive on examinations conducted by central or local authorities were used as the student achievement (math and reading skills) variable.

- *Distributive leadership*: Distributive leadership is more than the distribution of different leadership roles to teachers in schools; it draws a frame of how leadership practices are implemented (Bennett et al. 2003; Gronn 2003; Spillane et al. 2001, 2003).
- *Transformational leadership*: Transformational Leadership was mentioned by Burns (1978) at first and then developed as a leadership theory by Bass et al. The main purpose of transformational leadership is to conduct an organizational transformation by adapting to a rapidly changing environment.
- *Instructional leadership*: Instructional leaders are strong, guiding, and target-oriented culture architects. Instructional leaders focus primarily on improving students' academic output by making the strategies and activities of the school compatible with the academic mission of the school (Hallinger 2005).
- *Leadership practices*: are based on the Leadership Practices Inventory developed by Kouzes and Posner (2010). Leadership practices are examined under five main topics: modeling the way, inspiring a shared vision, challenging the process (taking risks to take the organization/institution a step further, seeking new ways, searching for opportunities), enabling others to act, and encouraging the heart.
- *Other leadership*: are the studies in which there is no theoretical style.

Data analysis

The effect size acquired in the meta-analysis is a standard measure value used to determine the strength and direction of the relationship in the study (Borenstein et al. 2009). Pearson's correlation coefficient (r) was determined to be the effect size in this study. The correlation coefficient is between +1 and -1, and this r value is converted into the value stated in table z (Hedges and Olkin 1985). Provided that more than one correlation value is given between the same structure categories in correlational meta-analysis studies, two different approaches are used to determine which to use in the meta-analysis (Borenstein et al. 2009; Kulinskaya et al. 2008). In this study, (1) all concerned correlations were included in the analysis and accepted as independent studies if all correlations are independent (*for example*, if the same people gave different samples in a study), and (2) the average of the correlations is used when dependent correlations are given (*for example*, if the values that are between the sub-dimensions of transformational leadership and student achievement or between the items falling under the same category with the leadership were given). There are a variety of methods to correct these average correlations; however, most of these methods can result in high-correlation estimations (Schyns and Schilling 2013). In this study, a conservative estimation was used as the average correlation, which creates a conservative estimation of the entire correlation.

There are two main models in meta-analysis: the fixed effects model and the random effects model. To determine which model to use, whether the model's prerequisites were met by the characteristics of the research studies included in the meta-analysis was considered (Borenstein et al. 2009; Hedges and Olkin 1985; Kulinskaya et al. 2008; Littel et al. 2008; Wampold et al. 2000). The *fixed effects model* covers (1) the assumption that the research is the same in terms of functionality, and the objective is to estimate the effect size for only one population defined. If it is believed that the research is not equal in terms of functionality and if generalizations through the estimated effect size are to be made for greater populations, then the model that should be used is the *random effects model*. When all conditions were taken into consideration, the *random effects model* was applied in the meta-analysis processes in this study. A *comprehensive meta-analysis* program was used in the meta-analysis processes.

Moderator analysis

Moderator analysis is an analysis method to test the direction of the differences between subgroups and between the average effect sizes of the variables.

Moderator analysis in a meta-analysis study is planned in accordance with the objective of the study, and the procedures are applied in accordance with this plan (Littel et al. 2008). The statistical significance of the difference between moderator variables is tested using the Q statistic method developed by Hedges and Olkin (1985). In this method, Q is divided into two variables, Q -between (Q_b) and Q -within (Q_w), and the analyses are conducted using these two separate Q_s . Q_w tests the internal homogeneity of the moderator variable, and Q_b tests the homogeneity between the groups (Borenstein et al. 2009; Hedges and Olkin 1985; Kulinskaya et al. 2008).

In this study, only the Q_b values were given because only the statistical significance of the differences between moderators was required. In this study, three moderator variables were determined, which were thought to play a role in the average affect size. The first variable was the leadership styles; a different style was approached in each research study, each style was measured, and the relationship between this type of leadership style and the achievement level was reviewed. This moderating variable was the leadership criteria used.

In the study, the moderators of leadership styles include: (1) distributive leadership, (2) transformational leadership, (3) instructional leadership, (4) leadership behaviors, and (5) others. *Distributive leadership* is the process of distributing tasks between the leader and followers at first and then integrating the tasks completed by group members. Therefore, the function of distributive leadership is a process that involves apportioning tasks between group members and completing tasks based upon more than one leader (Spillane 2006). In this context, distributive leadership involves more than distributing different leadership roles to teachers in schools; it draws a frame of how leadership practices are implemented (Bennett et al. 2003; Gronn 2003; Spillane et al. 2004). *Transformational leadership* was first mentioned by Burns (1978) and then developed as a leadership theory by Bass et al. The main purpose of transformational leadership is to facilitate an organizational transformation by adapting to a rapidly changing environment. *Instructional leadership* is one of the most important concepts related to learning and education within school processes. Hallinger (2005) describes instructional leaders as strong, guiding, and target-oriented culture architects. Instructional leaders focus primarily on improving students' academic output by making the strategies and activities of the school compatible with the academic mission of the school. *Leadership practices are based on* the Leadership Practices Inventory developed by Kouzes and Posner (2010). Leadership practices are examined under five main topics: modeling the way, inspiring a shared vision, challenging the process (taking

risks to take the organization/institution a step further, seeking new ways, searching for opportunities), enabling others to act, and encouraging the heart. Studies under the title of *others* are the studies in which there is no theoretical style.

Second, the level of education at the schools in which the research studies were conducted was determined as a moderating variable because it was thought to affect the average effect size. Additionally, the courses, which are the subject matter of exams that measure student achievement, were evaluated in terms of whether they qualified as a moderator by considering the relationship with which lesson is examined into. In addition, the relevant sampling group was found to be a suitable moderating variable.

Reliability and validity of the study

The credibility of the results is considered to be one of the most important criteria in a meta-analysis. Reliability and validity are criteria that are commonly used in studies. Particularly in qualitative research, these concepts are the most important elements in determining scientificity. In this context, the things made for reliability and validity are as below:

The studies included in meta-analysis could not be inevitably identical. One of the most critical issues is to determine how many of these studies are similar. It cannot be assumed that there is an objective methodology, and it varies from study to study. In this context, the criteria for inclusion determined by the researchers are presented in the section of methodology in detail.

- Apples and pears can be considered a symbol of the limitations and the power of meta-analysis simultaneously. In this study, while determining the criteria for inclusion and exclusion, the field of study (leadership and student achievement) was evaluated by considering all the features together. The objective determined for student achievement was to evaluate overall achievement but not to evaluate special achievements (skill).
- The moderator analyses in the study allowed for some comparisons and for seeing the effect according to the moderators.
- The random effects model was used because the studies included in the meta-analysis could not be functionally equivalent.
- Sensitivity was shown for publication bias in this study. Publication bias was prevented by conducting the study on both published and unpublished studies. In addition, no evidence was observed of publication bias by a funnel plot or tests, and it was determined that effect

size is not influenced by publication bias (see the Results section for publication bias findings).

- To determine the reliability of the coding system, two researchers performed the coding process, and *Cohen's Kappa* reliability coefficient between the coders was determined to be .93.
- The effect size calculations for each study included in the meta-analysis were presented in the "Appendix."

The basic condition for a study that uses sampling to reveal facts is that samples represent the population in the best way. However, regardless of the strength of the sample, it will never be the same as the universe because of *sampling errors*, which are the total errors that occur incidentally due to the units included or excluded from the sample. If the study had an infinite sample, the sampling error would be zero. In contrast, the samples of the studies included in the meta-analysis were not infinite. Therefore, it was inevitable that a sampling error occurred in the studies. In this context, a random effects model was used instead of a fixed effects model with the assumption that the real effect size was the same in all studies. Additionally, publication bias and the normality of the effect size of the studies were included in meta-analysis (see Borenstein et al. 2009).

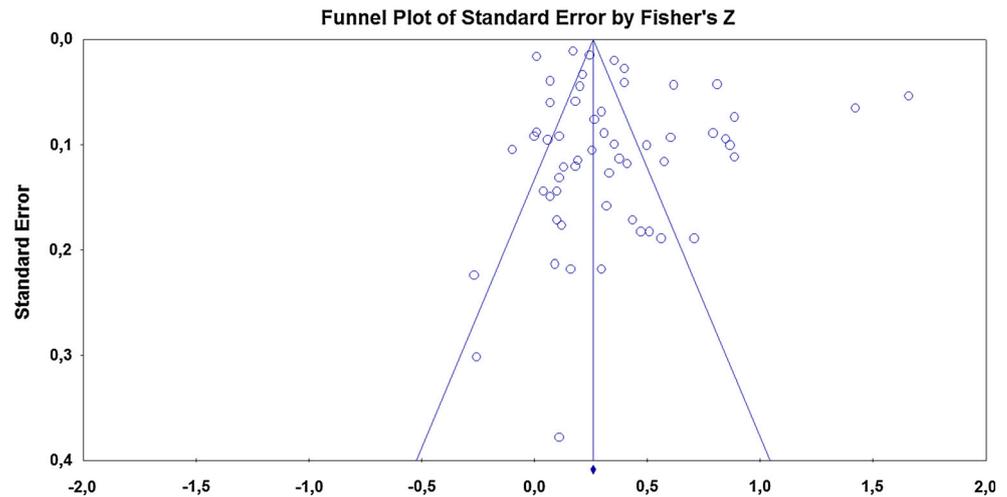
Findings

Findings related to the publication bias

Publication bias is based on the assumption that research on a definite subject is not published completely. Because research with no statistically significant relationships or with low relationships is not considered valuable enough to be published, the total effect size is affected in a negative way, and the average effect size increases non-objectivity (Borenstein et al. 2009; Hanrahan et al. 2013; Kulinskaya et al. 2008). The effect of such publication bias, which can also be called lost data, affects the overall research investigation of meta-analysis studies in a negative way. In this sense, publication bias was considered in meta-analysis studies. For this study, the following questions were asked to analyze publication bias:

- Is there any evidence of publication bias?
- Is it possible that the general effect size is the result of any publication bias?
- How much of the total effect size is affiliated with the publication bias?

In meta-analyses, several calculation methods are used to give statistical answers to the questions covering the

Fig. 1 Effect size funnel on publication bias**Table 2** Results of Duval and Tweedie's trim and fill test

	Excluding study	Point estimate	CI (confidence interval)		<i>Q</i>
			Lower limit	Upper limit	
Observed values		.34	.27	.41	1954.0
Adjustment values	0	.34	.27	.41	1954.0

possibilities stated above. The most common method is the funnel plot. Answers given by this method may not be accurately objective; however, they offer the opportunity for us to see whether the studies are written with a publication bias. The funnel plots of the research included in the meta-analysis of this study are shown in Fig. 1. In Fig. 1, no evidence of the possibility of any effect of publication bias was observed. A funnel plot is expected to be asymmetric at a significant level in the case of any publication bias. In particular, intensification (particularly on the right) of the line exhibiting the average effect size of the research, which is to be intensified at the bottom of the funnel, is an indicator of the possibility of publication bias. In this study, no evidence of publication bias was observed in any of the 57 studies subjected to meta-analysis.

Although no publication bias was observed in funnel plot, the results of Duval and Tweedie's trim and fill test, which is applied to determine the effect size related to the publication bias acquired with the meta-analysis using the random effect model, are given in Table 2. As shown in Table 2, there is no difference between the effect observed and the artificial effect size created to fix the effect of the publication bias. The research on each side of the center line is symmetrical, which is the indicator of non-difference. Because there is no evidence indicating lost data at

on either side of the centerline, the difference between the fixed effect size and the observed effect size is zero.

Findings related to the effect sizes

In Table 3, the meta-analysis of educational leadership and student achievement is shown. The findings supported H1, which asserted that there was a positive relationship between educational leadership and achievement. Educational leaderships' value regarding the effect on student achievement was calculated as .34. This value reveals that educational leadership has a *medium*-level effect on student achievement (see Cohen 1988).

In the moderator analysis performed, it was found that H2, based on the perspective that leadership style functioned as a moderator, was not supported. However, it was found that all leadership styles had significant and positive effects on student achievement. From the leadership styles obtained from the studies included in the meta-analysis, it was found that distributive [$r = .42$] and transformational [$r = .40$] leadership had a comprehensive effect on student achievement, leadership practices [$r = .35$] and other [$r = .33$] leadership styles had medium effect on student achievement, and educational leadership [$r = .24$] had low effect on student achievement. The strongest effect

Table 3 Correlations between educational leadership and student achievement: the results of meta-analysis

Concepts	<i>k</i>	N	<i>r</i>	CI		<i>Q</i>	<i>Q_b</i>
				Lower limit	Upper limit		
Leadership	57	28,964	.34*	.27	.41	1954.01*	
Moderator (leadership styles)							1.78
Others	8	11,647	.33*	.13	.51		
Distributed	2	309	.42**	.03	.70		
Transformational	15	2,169	.40*	.25	.53		
Leadership practices	24	9,900	.35*	.23	.45		
Instructional	8	4,939	.24**	.03	.43		
Moderator (courses)							2.09
Mixed	34	16,809	.36*	.25	.45		
Math	12	11,148	.25*	.07	.41		
Reading	8	635	.43*	.22	.61		
Language	3	372	.37**	.03	.64		
Moderator (the level of education at the school)							4.55
Elementary	24	6,843	.45*	.31	.57		
High	13	2,908	.28*	.07	.47		
Mixed	7	9,475	.26	-.03	.50		
Middle	9	6,864	.30**	.05	.51		
Secondary	3	2,823	.16	-.27	.54		

identified was distributive leadership. Notwithstanding the fact that the value of effect between leadership styles and students' achievement differs, in the moderator analysis performed according to the random effects model, the difference between the effect sizes of the leadership styles was not statistically significant ($Q_b = 1.78, p > .05$).

The findings did not support H3, which asserted that the courses studied to determine students' academic achievement were mediating variables for the effect of educational leadership on students' academic achievement. In the moderator analysis performed, the effect size difference between the courses was not found to be statistically significant ($Q_b = 2.09, p > .05$). However, it was identified that educational leadership had a positive and significant effect on all courses. Within this scope, educational leadership had a medium effect on math [$r = .25$], mixed [$r = .36$] and language [$r = .37$] courses and had a comprehensive effect on reading [$r = .43$] courses.

H4, which asserted that the level of education at the school was the moderating variable regarding the effect of educational leadership on students' academic achievement, was not supported. In the moderator analysis performed, the effect sizes between the level of education at the schools were not statistically significant ($Q_b = 4.55, p > .05$). Within this scope, from the level of education at the school discussed in the studies included in the meta-analysis, it was found that educational leadership had a comprehensive effect on students' achievement in the

elementary [$r = .45$] grades and that educational leadership had a medium effect on student achievement in the middle [$r = .30$] grades. In secondary [$r = .16, p > .05$] and mixed [$r = .26, p > .05$] grades, the effect of educational leadership on students' achievement was not found to be statistically significant.

Additionally, it was concluded that the confidence intervals calculated for all moderators included in the meta-analysis were broad (leadership style, the level of education at the school, the lesson searched for the academic achievement within the studies). This finding illustrated that the studies included in the study had homogenous characteristics.

Discussion

The aim of this meta-analysis was to analyze the overall results acquired from studies that examined the relationship between educational leadership and student achievement. The narrow confidence intervals in the meta-analysis indicate that the results of the research included in this study are reliable. This finding can be viewed as significant in terms of making more reliable decisions regarding the tendency and strength of the relationship-related results acquired by meta-analysis.

The meta-analysis results revealed that educational leadership had a medium-level positive effect on student

achievement. When educational leadership studies were examined, it was found that leadership is associated with student achievement (Brewer 1993; Griffin 2008; Heck et al. 1990; Kythreotis et al. 2010; Leithwood and Mascall 2008). However, there are ongoing discussions as to whether this effect on student achievement is direct or indirect (Alig-Mielcarek and Hoy 2005; Hallinger et al. 1996a, b; Louis et al. 2010; Witziers et al. 2003). Although some studies support that educational leadership directly affects student achievement (Fuller et al. 2011; Leithwood et al. 2008; Leithwood and Jantzi 2006), there are also some studies that conclude that it has an indirect effect on student achievement (Hallinger et al. 1996a, b; Mark and Printy 2003). In both cases, the medium and positive effect obtained in this meta-analysis study supported the literature. Furthermore, the results of the study are parallel with the literature on leadership and student achievement conducted by Chin (2007, $r = .48$), Hattie (2009, $r = .18$), Marzano et al. (2005, $r = .25$), Robinsin et al. (2009, $r = .43$), and Robinson et al. (2008, $r = .21$).

In the study, it was identified that leadership styles, the courses that are used in the measurement of students' achievement, and the level of education at the school and the sampling group are not moderators in the relationship between educational leadership and student achievement. On the contrary, when the effect sizes of leadership styles on student achievement are examined, the literature supports that distributive (Heck and Hallinger 2009; Leithwood et al. 2009; Louis et al. 2010) and transformational (Chin 2007; Hardman 2011; Kantabutra 2005; Koh et al. 1995; Lea 2011a, b; Leithwood and Jantzi 2000; Nash 2011; Sun and Leithwood 2012; Valentine and Prater 2011) leadership has a comprehensive effect. Education leaders who care about and heed the words of employees, taking personal requirements and interests into account and in short displaying supportive behaviors in the organization, are the representatives of change in schools (Burns 1978; Bass 1999; Bass and Riggio 2006; Leithwood 1992; Yukl 1999). Education leaders contribute to the further improvement of student outputs through the transformation of school culture in addition to performing the duties regarding the coordination and assessment of the education system. Similarly, distributive leadership practices, as an important component of the achievement in the school, are in close relation to student achievement and school performance (Harris 2012a, b). When it is considered that human behaviors occur not as a result of individual knowledge and skills but as a function distributed over individuals and situations, it is also inevitable that there will be distribution of these roles to the individuals and situations. In this case, leadership duties in the school are distributed to various leaders such as school principals, vice principals, curriculum experts, class masters, and

branch teachers (Spillane et al. 2001). It was also an expected result that instructional leadership had a more significant effect on student achievement than did leadership styles. This is because instructional leadership is one of the most important concepts related to learning and education within school processes. Hallinger (2005) describes instructional leaders as strong, guiding, and target-oriented culture architects. Instructional leaders focus primarily on improving students' academic output by making the strategies and activities of the school compatible with the academic mission of the school. The positive effect of instructional leadership on student achievement is supported by the literature (Eberts et al. 2002; Hallinger et al. 1996a, b; Lee et al. 2012; O'Donnell and White 2005; Valentine and Prater 2011). When the findings of leadership style moderator are examined as a whole, it is observed that instructional leadership has a weaker effect. It is thought that the most important reasons for this result are leadership scales. The Multifactor Leadership Questionnaire (Bass and Avolio 1997) was used nearly in all transformational studies included in meta-analysis, and the Leadership Practices Inventory (LPI; Kouzes and Posner 2010) was used in the studies based on leadership practices. However, the scales used for instructional leadership are various.

When educational leadership's effect on student achievement in terms of the courses used in the measurement of students' achievement was examined, it was found that all courses had significant and positive effects. In terms of the level of education at the school, it was detected that educational leadership had an intermediate and comprehensive effect at the elementary, high school, and middle school levels. It was identified that educational leadership in elementary school had a comprehensive effect on student achievement and in middle school and high grades had a medium effect on student achievement. When considering the administrative and executive features that the level of education at the school had, such as students' ages, the mission assumed for the education grade, and similar variables, it was an anticipated result that educational leadership's effect on student achievement varied in favor of the lower grades. The studies conducted supported the finding that the effect of leadership on student achievement in primary school was higher than for secondary and high schools (Louis et al. 2010; Witziers et al. 2003).

Limitations and directions for future research

This research was conducted using data obtained from primary resources. The most significant disadvantage of the present research was likely the correlational nature of the studies from which the data were obtained. It is not

objective to claim that the results obtained can exactly explain the causal effects when considering that the qualitative studies are more effective to explain the nature of educational leadership. Furthermore, the fact that the majority of the studies regarding educational leadership and students' academic achievement were correlational indicates the existence of a potential method bias.

It was not possible to reach all studies despite the strategies developed to access the studies to be included in the present meta-analysis. This was due to two reasons. First, the full texts of some studies were not accessible through the databases searched. Hence, presumably, some studies thought to include the data suitable for the present research were not accessed. Second, because the publication language of the studies included in the present research was limited to English, studies published in other languages were not accessed. Thus, the majority of the studies included were conducted in various states of the USA. Accordingly, this limitation should be taken into consideration when generalizing the results obtained. Although there was not a statistical result indicating a publication bias, the absence of publication bias was not ensured because it was not possible to access the unpublished studies. The fact that the sample of the present research consisted of

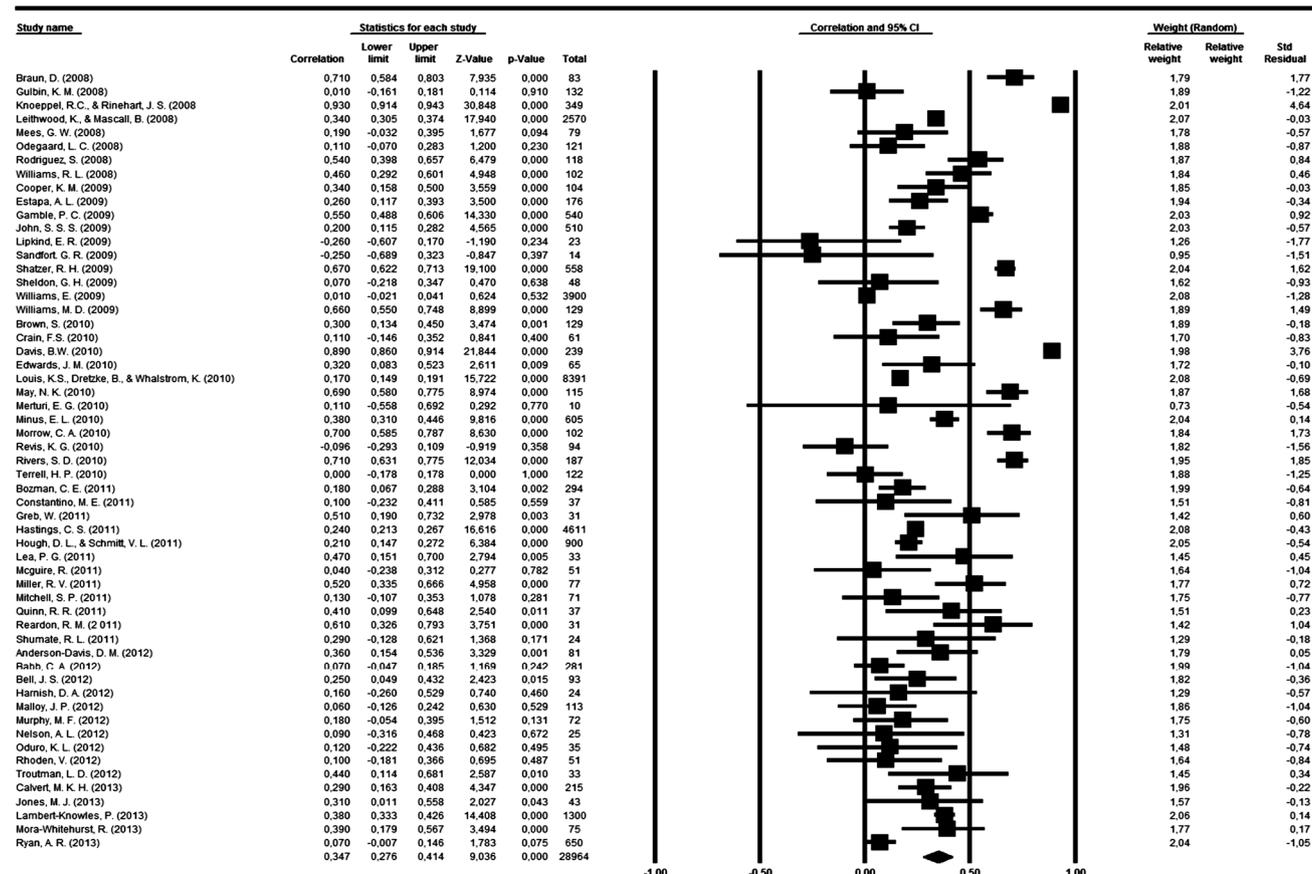
studies published from 2008–2013 was another limitation of the research.

Through the findings obtained as a result of the analyses, suggestions can be listed as follows:

- With reference to the positive effect of educational leadership on students' academic achievement, the necessary precautions should be taken into consideration to make the stakeholders adopt the educational leadership behaviors with the aim of accomplishing the instructional aims of the school.
- It has been found that most of the studies included this research did not report the correlation coefficient (*r*). For this reason, researchers should report findings giving way to meta-analysis instead of just providing a single finding.
- Further meta-analysis studies should take into consideration studies published in different languages to reveal cultural differences.

Appendix

Summary of study characteristics in the analysis results.



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Note: References marked with an asterisk indicate studies included in the meta-analysis

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